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ABSTRACT

Alternative delivery modes that can be used to transmit Information Services reports of the National Center for Higher Education Management Systems are discussed. The objective is to permit transfer of data in a more easily manipulable form. Attention is focused on the medium into which reports can be feasibly put, as well as ways in which the reports can be transmitted. The following four data storage media for transmitting Information Services reports to clients are considered: printed report, magnetic tape, floppy disk, mainframe computer disk. In addition to the medium to store the data, data transmission can be accomplished by hand delivery, U.S. mail, courier, facsimile, and telecommunications. Cost-related questions include: who absorbs the costs to develop new delivery modes, who pays the costs to transmit data, and how costs are determined. Since costs, clientele, and the technology need to be considered before NCHEMS makes firm commitments to alternative delivery modes, pilot testing of different modes will be undertaken in fiscal year 1985. (SW)

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A Study of Alternative Delivery Modes for Federal Data

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At present, the primary medium for providing Information Services reports to the client is the standard printed page sent via the U.S. Postal Service. On rare occasion, the data have been provided on magnetic tape also transmitted by mail. In recent years, there has been an increasing number of requests for NCHEMS to provide alternative methods of providing data and information. This is due in part to the recent, rapid developments in computing and telecommunications. Many users currently have access to on-line systems via the commercial networks such as Source, Med-line, Dialcom, and so on. There is also an increasing desire for more responsive turn-around times in receiving the data--currently NCHEMS guarantees delivery within seven days--and the need for the user to manipulate and/or format data to meet his own specifications.

This report will discuss some alternative delivery modes that can be used to transmit Information Services reports, allowing for transfer of data in a more easily manipulable form. Specifically, it will discuss the feasible medium into which reports can be put, as well as ways in which the reports can be transmitted. A separate technical report (P4-3) has also been submitted discussing the technical impact of these delivery modes on computer and overall information processing at NCHEMS.

Data Storage Media

Four data storage media for transmitting Information Services reports to clients have been considered potentially feasible by NCHEMS: printed report; magnetic tape; floppy disk; and mainframe computer disk. Each of these will be described briefly in this section.

Printed Page Reports

Currently, a printed report is used as the primary means of providing clients with standard and custom-designed Information Services reports and graphics. Providing clients with reports in this manner has become routine. The cost of providing the clients with printed reports is incorporated into the base price of the service and, compared with the other delivery modes that will be discussed here is quite inexpensive.

The printed report is designed to be self-explanatory and not to require any additional documentation for the user. The major disadvantage is that if a client desires to manipulate the data he has received, he must transcribe all of the data into manipulable form.

Magnetic Tape

On few occasions, Information Services clients have been provided reports and/or data on magnetic tape. This delivery mode requires an additional processing step that is not required for print output. To produce the output on magnetic tape, the program is run, and the results are stored temporarily on magnetic disk (for the printed page the information is sent directly to the printer at this step). Next a blank tape is mounted onto the tape drive and the results are copied onto tape. In addition, appropriate documentation on the tape formatting must be provided to the users of magnetic tapes.

Theoretically, all standard Information Services reports can be transmitted by magnetic tape since the programs to produce the information are the same as the ones used to produce the printed page. The client that receives data on magnetic tape can more readily manipulate the data once he receives the tape and copies it into his computer.

Floppy Disk

Floppy disks are used with microcomputers, and some minicomputers as well, and can be several different sizes--3-1/2", 5-1/4", and 8", with the 5-1/4" and 8" being the most widely used medium at present. Floppy disks have not been used to transmit Information Services reports thus far, but NCHEMS will pilot test this delivery mode in fiscal year 1985.

The floppy disk can potentially provide clients with the same flexibility that the magnetic tape does--clients will be able to manipulate data. Floppy disks will require some documentation. It is anticipated that either a straightforward print image or an output already in an electronic spreadsheet format (such as Lotus 1-2-3) will best meet the majority of client needs. The pilot-test phase in FY85 will determine whether or not this hypothesis is correct.

Using the floppy disk as a mode to transmit reports will, of course, require NCHEMS to establish new production procedures. This includes physical aspects linking the mainframe computer with a microcomputer in a production-oriented mode. There are other questions to be resolved such as the way or ways in which diskette-based reports are to be formatted. Two possibilities were mentioned in the previous paragraph.

Once data and/or reports are resident on a floppy disk, the disk itself could be sent by mail or by a courier service, or the material on it could be transmitted via telecommunications. Because there are so many different kinds of microcomputers with different capabilities (for example, memory size) and operating systems, it would be difficult for NCHEMS to meet the needs of all clients. Therefore, if NCHEMS were to offer floppy disks as a regular medium

for Information Services reports, we would most likely be able to offer that option only for a subset of currently available hardware. However, it is reasonable to expect that this problem will diminish rather than increase over time, as de facto standardization gradually increases and as emulation devices and programs become more widespread. The most widespread format is the IBM-PC format and practically all major microcomputers can read this format.

Computer-to-Computer

In simple terms, computer-to-computer communications is where two computers are linked to transmit data to one another. Since individual computers have different internal representations of data, it is difficult to carry on such transmissions in anything other than character representations of numeric data.

With an on-line system clients could access a data base by on-line requests of standard Information Services reports. The client would have to have a terminal or microcomputer with communication capabilities. The client would dial into a port at NCHEMS, log onto the NCHEMS computer, and then log into the NCHEMS data base access request system. The client could then request reports that could be generated either at that time or in batch for later deposit into the client's 'mailbox'. If the reports are deposited into a 'mailbox', the client would then retrieve the reports at his convenience. In addition to providing reports to clients, other services could be offered such as allowing a client to utilize statistical packages via the on-line system.

An on-line database system provides an immediate response to the user as well as being highly efficient. Staff time would not be required to load data tapes and run computer programs for each individual report.

Currently, NCHEMS does not have either the hardware or software capability to transmit Information Services reports on a computer-to-computer basis. This process would require acquiring up-to-date hardware and software, and considerable staff time to develop and/or implement the necessary software, user interface programs, protocols, and accompanying documentation. It is probably not a feasible delivery mode for NCHEMS to offer in FY85 but one that is being considered for future years.

Transmitting the Data

In addition to the medium to store the data, there are several ways that the data can be transmitted: hand-delivered, U.S. mail; courier (such as Federal Express); facsimile (such as Federal Express Zap Mail); and through telecommunications. Of course, not every medium that has been discussed in this paper can be transmitted by every form. Table 1 shows how the different mediums can potentially be transmitted.

The various ways to transmit the data differ greatly in time and cost. Telecommunications and facsimile are the quickest since these two can be done in a few hours, whereas the U.S. mail can take between two to seven days. Immediacy is also correlated to cost. At the low end of the scale is the U.S. mail where reports currently can be transmitted for as little as 20 cents; at the other end, is the facsimile network which costs a minimum of $25.00 or telecommunications which potentially could cost even more.

Table 1

Data Storage Media and Delivery Methods for Information Service Reports

NCHEMS Data Storage Medium	Method from NCHEMS to Client		
	Mail	Courier	Telecommunications
Printed page (Report/Graphs)	Now Available	Now @ Client option	Zap Mail
Magnetic Tape (Report/Character Data 800/1600 ASCII/EBCDIC)	Now Available	Now @ Client Option	Not Required
Floppy Disk Report/Character Data PC-DOS 8/9 Sector 40 track ASCII	Limited Pilot Test FY85	@ Client Option	Limited Pilot Test 2nd half FY85
Mainframe Disk	N/A	N/A	Plans for FY86-90 On-Line Access Potential

N/A = not applicable

Discussion

If new reporting mediums are introduced in Information Services, there are a number of cost-related factors that need to be considered. First, who absorbs the costs to develop the new delivery modes? NCHEMS, or clients? New computing equipment will be required, as well as additional staff. Thus far, NCHEMS has passed additional costs on to the client when such a request has been made. For example, when reports are delivered to a client by Federal Express at his request, the client is charged the regular cost of the reports as well as the Federal Express charge. Similarly, when clients have received reports on magnetic tape, the requests have been treated as "custom" reports and the costs to be passed along are determined by the amount of staff and computer resources needed to generate the tape.

Secondly, who pays the costs to transmit the data and how will they be determined? It is quite easy to determine a Federal Express charge, but more difficult to determine charges when telecommunications are used. To make things even less clear, potentially either NCHEMS or the client could initiate a telecommunications process--therefore, would the charge be built into the process, or would there be a surcharge?

The client needs and capabilities will also have to be considered when and if NCHEMS provides Information Services reports on media other than the printed page or magnetic tape. The pilot test for providing clients with the reports on floppy disks will help clear up some of the questions that now exist. We suspect that there will be an uneveness in the sophistication of the users that request data in alternative formats--both in terms of expertise as well as the hardware and software at their disposal.

In addition, NCHEMS Information Services clientele (while devoted to the service) is not large--and this raises questions whether NCHEMS (or the client) can afford the costs associated with providing Information Services in a number of ways. Although every client can utilize the printed page that is now provided, only a subset will probably be able to utilize some of the delivery media that have been discussed in this paper. For example, many of the Information Services clients are from very small colleges, and they may not have the staff or the equipment to utilize more sophisticated delivery media. On the other hand, for those clients who do have the staff and equipment to utilize more sophisticated delivery modes, these mediums could provide them with greater convenience and flexibility.

Before NCHEMS makes any firm commitments to alternative delivery modes, it needs to consider the clientele, the costs, and the technology. The pilot testing in FY85 will enable firm decisions to be taken for FY86 and beyond.